

Fingerprints

FOR DUMMIES

Frequently Asked Questions

FINGERPRINTS
PALMPRINTS
FOOTPRINTS
LATENT PRINTS

**Always
Free**



SIMPLE FINGERPRINT EXPLANATIONS FOR NON-EXPERTS

Frequently Asked Questions about Fingerprints

The FAQs on these pages have resulted from the most common questions the www.onin.com Webmaster has received in recent years.

The answers on this page come from several sources, including Certified Latent Print Examiners at crime labs in America and Fellows of The Fingerprint Society. Insofar as possible, content conforms with guidelines of the IAI, and the FBI Laboratory sponsored Scientific Working Group on Friction Ridge Analysis, Study and Technology (SWGFAST). Officially though, these answers do not purport to represent anything other than [Ed German's](#) general topic answers about fingerprints.

[Comments](#) and suggestions are welcome.

What are the fundamentals of the science of fingerprints?

Why didn't the police dust my house (or car) for prints when I reported that thieves broke in?

- **On What kinds of evidence can fingerprints be developed?**
- **How long do fingerprints last on evidence?**

Are fingerprints inherited... are they more similar between family members than between strangers?

Is fingerprint identification a science... and can tiny fragments of finger or palm prints be reliably identified in accordance with modern legal and scientific guidelines?

Why do only some crime labs search unsolved case fingerprints in the FBI's national criminal fingerprint file (IAFIS)?

What is the difference between fingerprint biometrics and automated fingerprint identification systems (AFIS)?

What are the fundamentals of the science of fingerprints?

Q1

Who are you? Click on the correct category to see the best answer:

[Elementary School Student](#)

[John Q. Public](#)

[Police Officer](#)

[Criminal](#)

The two basic ideas scientists believe about fingerprints are:

- **Fingerprints never change.** Small ridges form on a person's hands and feet before they are born and do not change for as long as the person lives.
- **No two fingerprints are alike.** The ridges on the hands and feet of all persons have three characteristics (ridge endings, bifurcations and dots) which appear in combinations that are never repeated on the hands or feet of any two persons. A ridge ending is simply the end of a ridge. A bifurcation is a Y-shaped split of one ridge into two. A dot is a very short ridge that looks like a "dot."

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The basic fundamentals in the science of fingerprint identification are permanence and individuality.

Permanence: Fingerprint ridges are formed during the third to fourth month of fetal development. These ridges consist of individual characteristics called ridge endings, bifurcations, dots and many ridge shape variances. The unit relationship of individual characteristics does not naturally change throughout life... until decomposition after death. After formation, an infant's growing fingerprint ridges are much like drawing a face on a balloon with a ball-point pen and then inflating the balloon to see the same face expand uniformly in all directions. Unnatural changes to fingerprint ridges include deep cuts or injuries penetrating all layers of the epidermis and some diseases such as leprosy.

Permanent scars, disease damage, and temporary changes such as paper cuts appear as jagged edges and sometimes "puckered" ridge detail in opposition to smooth flowing natural formations. Warts can come and go, but generally push apart an area of friction ridges and can disappear completely when the wart is gone because they are not a part of the friction ridge structure. Look at a wart with a magnifying glass and you will notice that the friction ridges "surround" the wart. Senile atrophy of friction skin due to old age causes the ridges to often almost flatten, causing fingerprints with many creases (creases are also unique but not always permanent) and poorly defined ridges. Oddly, newborn infants also often have more creases than clearly defined ridge detail in their barefoot prints. The creases are unique, but change relatively rapidly and often disappear as the infant grows. The best chance of seeing friction skin ridges on newborn infant footprints is to look carefully with a magnifying glass on and near the big toe.

Individuality: In the over 140 years that fingerprints have been routinely compared worldwide, no two areas of friction skin on any two persons (including identical twins) have been found to contain the same individual characteristics in the same unit relationship. This means that in general, any area of friction skin that you can cover with a dime (and often with just a pencil eraser) on your fingers, palms, or soles of your feet will contain sufficient individual characteristics in a unique unit relationship to enable positive identification to the absolute exclusion of any other person on earth. Recent studies comparing the fingerprints of cloned monkeys showed that they, just like identical twin humans, have completely different fingerprints. When doctors state that twins have the same fingerprints, they are referring to the class characteristics of the general ridge flow, called the fingerprint pattern. These loop, arch and whorl ridge flow patterns have nothing to do with the individual characteristics used to positively identify persons. Before modern computerized systems, fingerprint classification was essential to enable manual filing and retrieval of fingerprints in large repositories.

For many years experts testified that no two fingerprints in the hundreds of millions of fingerprint cards on file in America had ever been found to be alike. This was misleading in that large fingerprint files were for the first 110 years of police usage separated into small file categories by class characteristics such as:

- sex
- age
- presence of scars
- presence of whorl, loop and arch formations in various fingers
- ridge counts and tracings between different pattern focal points (deltas and cores)

Thus, for example, at the FBI's former Identification Division with over 200 million fingerprint cards, no individual card and no individual fingerprint was ever completely compared against all the other fingerprints on file. In such manual filing systems fingerprints were compared only with corresponding fingerprint cards possessing the same class characteristics.

This all changed with the advent of AFIS (Automated Fingerprint Identification Systems), and many agencies have now compared thousands of individual fingerprints (such as fingertip impressions from crime scenes) against every fingerprint in the entire repository. None have been found to have the same individual characteristics in the same unit relationship.

Math is the only exact science. However, fingerprint identification lends itself well to mathematical

validation. As of September 2002, at least seven state AFIS sites make fingerprint card to fingerprint card positive identifications without human intervention. Latent prints (finger, palm and foot) from crime scenes are not positively identified by computers primarily because of background interference (dirt, scratches on items/surfaces touched, etc.) and the relatively poor clarity of some crime scene latent prints.

When DNA evolved as a science, the term "DNA fingerprinting" was adopted to lend credibility to that science's newcomer status which is in its infancy compared with the empirical validation of fingerprint identification worldwide. DNA analysis as commonly practiced in forensic science laboratories cannot differentiate between identical twins, but fingerprints have always been able to differentiate identical twins.

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The basic fundamentals in the science of fingerprint identification are permanence and individuality.

Beyond the John Q. Public info you can read by clicking [here](#), you should know that a "positive identification" is not necessarily a "positive identification". The science of friction ridge identification leaves **no room for error** when professional guidelines are followed in its application... but, in any field of human endeavor (including simple math addition, subtraction, etc.) there will always be oversights.

Every competent fingerprint expert will have an identification verified. Procedurally, at most agencies it is not an identification until it is verified by another competent expert. Most state and federal level crime labs will not even inform you that a fingerprint match occurred until after the "identification" has been verified. An exception to this rule is fingerprint card to fingerprint card identifications made in some Automated Fingerprint Identification System (AFIS) computers. Latent print "matching" scores at AFIS sites are normally evaluated and "verified" by two human experts before the "identification" is reported.

Never base an identification on just the matching fingerprint classification. A matching fingerprint classification (Henry classification, NCIC classification, etc.) means only that the person printed belongs to the group of persons whose prints all have that same classification... just like sorting out a large number of persons based on sex, age, height, weight, eye color, etc. The identification should be verified by a well qualified fingerprint expert based on a comparison of the individual characteristics in the fingerprints... not based on the classification. In some agencies the **inked print to inked print** identifications are automatically reported after computerized matching in an AFIS (Automated Fingerprint Identification System) with a minimum matching "score" set so high that human intervention is not necessary. Low score matches in an AFIS are checked and verified by humans.

Do NOT have an arrest warrant issued based on a fingerprint "match" unless you are certain of the credentials of the expert. Unless an ID tech at your agency was an expert before they attended schools such as the one-week FBI classification course and the one-week FBI latent print techniques course, they did NOT leave those schools as experts (the FBI issues certificates of attendance... not certificates of successful course completion). Although American law accepts them as experts with such little training, they are not. In court they only have to have more knowledge about fingerprints than the average man on the street to be legally qualified as an expert.

Most fingerprint experts train for **at least** two or three years under the watchful eye of experienced Latent Print Examiners before they are allowed to work unsupervised on latent prints from crime scenes. Self-training can equip an ID tech at a small department with the same two weeks of experience, 50 times over. Also, a deputy who looks at latent prints a couple of hours per month for ten years does NOT have ten years experience... he has the equivalent of a few weeks of crime lab type experience... and it is poor quality experience if his work was not reviewed. How much is he missing if he only takes his "idents" to someone else for verification. He may only be identifying the prints a chimp could match and missing more difficult impressions.

Although there are very competent fingerprint experts in America who hold no certification, over nine hundred have attained the title of Certified Latent Print Examiners from the International Association for Identification (IAI) after completion of stringent testing (most years less than 50% of those persons taking the six hour exam have passed). In recent years the IAI has simplified the classification portion of the test and there is now no reason for any latent print examiner to avoid testing with excuses such as, "I only work with latent fingerprints and don't do filing so I can't be tested on classification." Suspect their expertise if they use such excuses. A part time expert with poor quality training will not be able to pass the examination.

q1c

The basic fundamentals of fingerprints are **permanence** and **individuality**.

You will end up **permanently** in jail if you live in one of the "three strikes and you're out" states after the third time your fingerprints are found at the crime scene.

The **individuality** of your fingerprints makes it easier to keep your arrest record separate from other convicts.

Why are you reading this???

Wear gloves... we sometimes like to identify you from your shoe prints, that drop of blood by the broken window, or the many other traces of your presence left behind.

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Why didn't the police dust my house (or car) for prints when I reported that thieves broke in?

Q2

Who are you? Click on the correct category to see the best answer:

Elementary School Student

John Q. Public

Police Officer

Criminal

They probably didn't have enough time to do everything possible. The police must divide their time between many different crimes each day.

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Time and money... and maybe poor training.

Time: No agency can do everything in every case. Some police agencies are understaffed and do not process crime scenes when no personal injury occurred, or when the dollar value of damage and items stolen is under a certain amount (such as \$500 or \$1,000).

Money: As with the paragraph above, police budgets may limit the manpower (time) available for processing some crime scenes. Also, **because of money you normally do NOT want** the police to process all the surfaces in your home or car using all possible processing methods to collect all available latent fingerprints. For example, using all possible methods in your car would make it worthless. Using all possible methods in your home would probably mean the destruction of carpeting and furniture, plus the sealing (with lacquer, etc.) and

repainting of many wall surfaces to repair dye stain and chemical damage. It is not unusual for a crime laboratory or evidence response team to do tens of thousands of dollars in damage to a home they completely process (typically for a who-done-it murder).

Poor training: Ask the average policeman who comes to your house what is left behind in latent fingerprints and he will probably say "oils." That could happen if the burglar were eating fried chicken, just put on Vitalis, or was rubbing his oily face... but, oil and fatty substance secreting glands on the human body (sebaceous glands and apocrine glands) are NOT present on surfaces lacking hair... that is, NOT on finger, palm or barefoot friction ridge skin. A slight amount of trace oil can sometimes be present because of "flow" on the skin surface from the back of the hand to the front, but such oil is only a slight trace compared with the oil you get on your fingers from rubbing your nose or forehead. Natural secretions from the sweat secreting glands (called eccrine glands) on fingers and palms (and bare feet) secrete NO OILS. They secrete about 98 or 99 per cent water, and the solids dissolved in the water include amino acids, proteins, polypeptides, and salts.

If you want to duplicate the basic effect of fingerprints on evidence, clean off a rubber name stamp so it leaves no ink traces behind. Next dip it into a solution of chicken broth. Shake off the excess liquid and stamp the impression on a drinking glass. Within a few minutes the liquid will dry and the impression will be almost invisible. Make another test impression on a piece of paper and let it dry. Unless you happen to have oily chicken broth you have just roughly (very roughly) duplicated the natural secretions present in latent fingerprints at crime scenes. Some researchers have compared dried eccrine gland secretions to a very faint coating of dried "shellac."

Latent fingerprints on glass, paper, or similar nonporous surfaces should be chemically processed to develop the best quality (greatest contrast) ridge detail. Picking up the glass with a handkerchief around your hand would destroy the test print... so would putting it in a plastic bag or envelope to carry it to a crime lab. Doing the same with the paper would not harm the test print there because it has soaked down into the paper fibers. Dusting the glass with fingerprint powder will probably destroy the latent print (there's usually no oil for it to stick to) and will almost never give the excellent results possible with chemical processing. Without chemical processing, the best you could probably do would be to "rejuvenate" the impression on the glass by breathing on it and then dusting with powder immediately after you see the "fogged" area on the glass evaporate. The moisture from your breath will leave the ridge detail slightly moist for a short while and increase the chances of fingerprint powder sticking to the non-oily print.

On what kinds of evidence can fingerprints be developed? Many police will remark that a certain surface cannot be processed for fingerprints. Any surface that is about as smooth as the miniature corrugated cardboard type ridges on your fingers can potentially bear identifiable latent fingerprints... and the flexibility of the finger skin can often also conform to relatively rough surfaces such as imitation leather dashboards. Fingerprints from crime scenes have been identified on papers, cigarettes, fruit, crumpled aluminum cans, plastic garbage bags, bed sheets, rocks, dead bodies (prints on bodies are usually contaminated prints involving body fluids, lipstick or some other substance transferred via the suspect's fingers), and thousands of other surfaces

How long do fingerprints last on evidence? Fingerprints on paper, cardboard and unfinished wood can last for up to forty years (per actual casework histories) unless exposed to water (and contaminate transfer prints can even then sometimes persist). Fingerprints on non-porous surfaces such as plastic, metal and glass can last for many years if not exposed to water and if left undisturbed.

Can a Fingerprint Expert determine if latent prints are "fresh" versus old? Estimates about the age of latent prints are unreliable when the experts guessing have no idea what was on the fingers that touched a surface. Latent prints that develop "quickly, strongly or dark" are not necessarily consistent with having been "recently" deposited. Unless scientific analysis of latent print residue on evidence was completed before processing with powder or chemicals to visualize latent prints (which is an analysis seldom performed because latent prints tend to be invisible until processed), then the nature of the latent print residue deposited by the fingers or palms cannot be known (whether it was fried chicken oil, grease, natural secretions from the fingers, etc.). Circumstantial evidence such as information that an item was cleaned thoroughly with glass cleaner, soap and water, etc., could date latent prints on the item as not being older than the last

thorough cleaning.

So what is normal if the police do come out and process your home or car for latent prints? Unless it's a murder or rape, they usually only dust with powder for prints even though it leaves behind or destroys probably over 50% of the identifiable prints on glass, plastic and metal surfaces.

If the responding police are knowledgeable and have the time/money to give good service for your situation, they will probably use a strong flashlight and carefully look at shiny surfaces for fingerprints which can often be photographed without dusting... and using a strong flashlight they can also save time by not dusting a dresser top that has an undisturbed layer of house dust on it (it wasn't touched by the perpetrator). Good crime scene procedure at a burglary or rape also involves making the rooms dark and looking with a strong flashlight for footwear impressions in dust (especially behind a TV or VCR location on tile or vinyl floors). Such footwear impressions can be photographed, and then lifted with electrostatic dust lifters, gel lifters, or specially prepared (black) silicon rubber. Investigators should dust the doors, windows, dressers and other large, immovable surfaces after photographing identifiable prints they found with special lighting (such as bouncing the flashlight almost straight back into the camera from the shiny surface, or sometimes skimming the flashlight beam just across the surface). Yes, just looking with a flashlight and dusting leaves behind many of the identifiable latent prints... but, it is normally not reasonable to do tens of thousands of dollars damage to a home or business to get every possible latent fingerprint from a burglary. Such processing also takes days and the home/business cannot be occupied while the chemical processing is in progress.

In an ideal situation, investigators should collect and take with them any small items (especially envelopes that were opened... burglars often remove gloves because this is difficult unless barehanded) known to have been touched, **and which are okay to be destroyed during processing**. Sometimes only a portion of an item (computer exterior case only, etc.) will be collected for processing so as to limit the destructive dollar value and still maximize the chance of solving the crime. Ideally, nonporous surfaces (which a drop of water would probably not soak into) should be superglue fumed at the crime scene before transit OR transported in such a way as to minimize contact between any smooth surfaces and packaging materials/containers. A beer bottle, for example, should either be superglue fumed at the crime scene or carried upright in a box with minimal contact against any side surfaces. Putting a beer bottle (or gun, can, knife, credit card, etc.) in a plastic or paper bag (or envelope) can sometimes be about the same as wiping it clean.

Investigators should never dust paper or cardboard surfaces with fingerprint powder if the surface can be collected for chemical processing. Dusting papers and cardboard gets very few prints (only those with contaminants such as oil from eating fried chicken). Investigators often learn about dusting papers at training where it works well on oily prints from intentionally touching their face, or on "fresh" natural secretion prints that haven't had a chance for the water to dry yet. In the real world, it is poor police procedure unless they are just wanting to make victims feel better that at least the police appear to be trying.

The police may look at your home/car with an alternate light source while wearing goggles to see fingerprints that might glow (when viewed through orange goggles or filters). They may also use the same light without goggles like a strong flashlight. Alternate light sources are similar to a portable laser, with only a few wavelengths of light shining - typically blue-green or UV. Without doing hours of fuming and other chemical preparation, the chances of finding a fingerprint that glows without chemical treatment (called inherent luminescence) are slim. However, if the police use the visible wavelengths (not UV) of the alternate light source without goggles like a strong flashlight, then they at least have a fair chance of finding some fingerprints. Often they will use an orange or green colored dusting powder along with an alternate light source. The bottom line is that a ten dollar flashlight with fresh batteries will find as many or more crime scene fingerprints than an alternate light source without using special chemical fuming and dye stains that tend to destroy the surface processed.

In addition to the information you can read in the John Q. Public answer by clicking [here](#), you should know that latent fingerprints are very fragile and you are destroying them if you:

- Pick up a gun, glass, bottle, knife, credit card, etc., with gloves or a handkerchief touching any place the perpetrator's prints might be. Papers can be handled with gloves or your handkerchief without harming latent prints so long as your gloves or handkerchief are not oily or contaminated. Never, ever dust papers or cardboard with powder unless you are just doing a "public relations show" and are willing to ignore excellent latent fingerprints that can be developed with chemicals.
- Put that same gun, glass, bottle, knife, credit card, etc., in a plastic bag, paper bag or envelope... you are destroying latent prints that may exist where the packaging material comes into contact with it.... it's about the same as wiping it clean in many instances. Either transport the item to the crime lab in such a manner that minimizes any contact of smooth evidence surfaces with anything else... or [superglue fume](#) the evidence before transport (you won't hurt DNA or drug testing per recent research).

A bright flashlight with fresh batteries is your best friend for finding latent fingerprints at

crime scenes.

Fingerprints are not normally [oily](#) so you should realize that just dusting with powder is probably going to miss 50% of the identifiable latent prints that could be found if all possible crime scene processing techniques were utilized. Most crimes cannot justify such expenses of time and manpower, so your compromise is to dust the points of entry, exit and surfaces known to have been touched (this will get the occasional oily contaminated latent prints there)... AND collect smaller items that can be processed at the crime lab for all possible prints. Those small items will be basically destroyed with chemicals.

Carry the office and home phone numbers of a Latent Print Examiner from your supporting crime lab in your crime scene processing kit. Call him up and ask questions if uncertain. Those folks exist to support your forensic science needs.

[John Q. Public's Answer](#)

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You are lucky! The police can't do everything, every time... but, keep looking over your shoulder, just in case.

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Are fingerprints inherited... are they more similar between family members than between strangers?

Who are you? Click on the correct category to see the best answer:

[Elementary School Student](#)

[John Q. Public](#)

[Police Officer](#)

[Criminal](#)

q3es

Are fingerprints inherited... are they more similar between family members than between strangers?

The general shape or overall pattern of finger and palm prints can be inherited. Family members will often have similar patterns or designs (whorls, loops, etc.) on the same fingers of their hands. The tiny details in the fingerprint ridges, however, are not inherited and are different between all friction skin areas of all persons... even between twins.

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Are fingerprints inherited... are they more similar between family members than between strangers?

The overall general flow or pattern ([Level 1 detail](#)) of friction ridges on human hands and feet is governed primarily by the height and position of the volar pads formed before birth. The formation of the volar pads is affected by inherited traits from the parents. High pads will form whorls, low pads arches, a medium height pad to one side a loop, etc. Thus twins or close relatives may have very similar ridge flow patterns (also called finger or palm print classification).

A few related articles are listed as follows:

[Heredity in Fingerprints](#), G. Shahan, ID News, Vol XX, No. 4, pp. 1, 10-14.

[A Family Fingerprint Project](#), J.S. McCANN, ID News, May 1975, pp. 7-11.

[Inherited Characteristics In Fingerprints: \(or Theory of Relativity\)](#), T. Jones, The Print, Vol 4, No. 5.

q3po

Are fingerprints inherited... are they more similar between family members than between strangers?

Fingerprint patterns are inherited and thus non-fingerprint experts looking in a police fingerprint file must be careful not to confuse fingerprint records of close relatives based on fingerprint classification ([Level 1 detail](#)). Likewise, a National Crime Information Center Fingerprint Classification Code (FPC) may be very similar for close relatives.

The actual finger and palm print detail used to effect an identification is not inherited and experts have no problem differentiating even identical twins.

See the [John Q. Public answer](#) for more details.

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Are fingerprints inherited... are they more similar between family members than between strangers?

q3c

Only the overall whorl, loop, etc., patterns are inherited. The police might confuse your fingerprints with your twin brother's... for about ten seconds. The moment they put a magnifying glass on them they will see obvious differences.

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Is fingerprint identification a science.... and can tiny fragments of finger or palm prints be reliably identified in accordance with modern legal and scientific guidelines?

Q4

Who are you? Click on the correct category to see the best answer:

[Elementary School Student](#)

[John Q. Public](#)

[Police Officer](#)

[Criminal](#)

Is fingerprint identification a science.... and can tiny fragments of finger or palm prints be reliably identified in accordance with modern legal and scientific guidelines?

Yes.

It is scientific.

Fingerprints have been collected, observed and tested as a means of unique identification of persons for more than 100 years.

Scientists have proven the validity of fingerprint identification, including tiny fragments, in courts throughout the world for many years.

[John Q. Public's Answer](#)

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Is fingerprint identification a science.... and can tiny fragments of finger or palm prints be reliably identified in accordance with modern legal and scientific guidelines?

Yes.

Some common definitions of science are:

The observation, identification, description, experimental investigation, and theoretical explanation of phenomena.

Accumulated and established knowledge, which has been systematized and formulated with reference to the discovery of general truths or the operation of general laws; knowledge classified and made available in work, life, or the search for truth; comprehensive, profound, or philosophical knowledge.

Knowledge when it relates to the physical world and its phenomena, the nature, constitution, and forces of matter, the qualities and functions of living tissues, etc.

Any branch or department of systematized knowledge considered as a distinct field of investigation or object of study; as, the science of astronomy, of chemistry, or of mind.

Any domain of knowledge accumulated by systematic study and organized by general principles.

With over 100 years of systematic observation and scrutiny, detailed in thousands of pages of peer reviewed observations worldwide, friction ridge identification easily qualifies as a science.

Court challenges to the scientific nature of friction ridge identification are not new and were attempted even before recent court decisions.

Daubert hearings are the "flavor of the day" insofar as the format of fingerprint challenges. Instead of seeking their own independent expert to determine if the government erred in its incriminating identification work, Defense instead attacks the scientific validity of even making such identifications.

Daubert Opinion States that:

- the trial judge must still screen scientific evidence to ensure it is relevant and reliable;
- "the focus, of course, must be solely on principles and methodology, not on the conclusions they generate;"
- and, factors the court should consider include:
 - testing and validation
 - peer review
 - rate of error
 - "general acceptance"

Because of the overwhelming evidence of the validity of friction ridge identification as a science, Defense does not dare to challenge the basic fundamentals of friction ridge identification: "uniqueness and permanence." Instead, the tactic is to attempt to differentiate

crime scene evidence impressions as somehow a different type of comparison from what occurs between arrest and conviction fingerprint records (which form the basis for the criminal arrest histories in America).

Of the Daubert criteria factors the court should consider, Defense typically attacks the "rate of error" most stringently. Unfortunately for them, in Daubert the rate of error has to do with the scientific procedure or methodology, and not with mistakes occasionally made by individual experts.

Defense points to the low rate of success (about 50%) for experts during the testing process for certification as a Latent Print Examiner by the International Association for Identification. What Defense does NOT advertise, is that the low success rate is due to the difficulty in making enough identifications within the time allotted, and not due to erroneous identifications (though the stringent time constriction for the test could tempt a participant to guess when they are not certain).

Defense also points to results of annual proficiency tests purchased by laboratories. The test results pointed out by Defense included a number of non-fingerprint expert results which did not accurately reflect the capabilities of certified experts and others who embrace and work within national standards. Some of the experts producing errors were merely forensic scientists (perhaps professors?) without expertise in friction ridge identification.

Defense concentrates on terms like "tiny, smudged and distorted" crime scene finger and palm prints in an attempt to differentiate criminal evidence fingerprint work from arrest history fingerprint identifications. The assumption that crime scene impression identification is different from inked print to inked print comparisons is false. It is not unusual for crime scene friction ridge impressions to have better quality and quantity of ridge detail than the inked prints to which they are compared. It is also not unusual for the comparison of poor quality inked fingerprint cards to be as difficult as crime scene impression comparisons. The friction ridge detail is represented as "better or worse quality and quantity" information, regardless of whether the recording medium is ink, sweat, blood, oil, or digital capture using a live scan fingerprint "reader."

ALL FRICTION RIDGE IDENTIFICATIONS ARE MADE USING THE SAME DECISION ([ACE-V](#)) PROCESS.

Depending on the quality (clarity) and quantity of friction ridge detail present, a fingerprint expert comparing two inked prints between arrest fingerprint cards may use ALL of the information in the questioned inked impression (on the new FP card) to effect an identification against a file print. Defense typically avoids the fact that an identification is often established between arrest FP cards using only a fraction of the unique friction ridge detail present in two inked prints... exactly the same way crime scene impressions are compared.

ALL FRICTION RIDGE IDENTIFICATIONS ARE MADE USING THE SAME DECISION ([ACE-V](#)) PROCESS.

As explained [here](#), there is zero tolerance for identification errors in friction ridge identification. Friction ridge identification is [reliable](#).

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Is fingerprint identification a science.... and can tiny fragments of finger or palm prints be reliably identified in accordance with modern legal and scientific guidelines?

Of course. Trust your crime lab.

Click [here](#) to see details of court challenges to the science of friction ridge identification.

Who do you see or hear making allegations of the absence of science in forensic laboratories employing latent print examiners? Here are some of the recent characters:

1 - Defense attorneys who don't claim the incriminating fingerprints were not made by their client, but instead that fingerprints cannot be scientifically identified in a crime lab. Yes, they know they can click [here](#) and hire an independent expert with credentials as good as the government's expert for less than the cost of a Daubert hearing. And no, don't expect them to give a direct answer as to why they don't just have another expert explain how and why the impression was not made by their client... let's not confuse things with the truth.

2- An author (Simon Cole) who has written a book (at least partially based on lurking on the Internet and monitoring persons he believed to be fingerprint experts). The book venture may benefit from any publicity about fingerprints. Like news stories, status quo doesn't sell books... controversy, exposé and hints of big trouble can boost sales. In a [special court hearing](#) just about him, Simon Cole was offered the opportunity to prove the important value of his claimed knowledge and expertise about the scientific value of fingerprint testimony. The judge ruled, ..."Even applying the Federal Court's Daubert Standard, what Dr. Cole has offered here is 'junk science'..."

3 - A Law Professor (James Starrs) who is embarrassed because his wizard-like prediction of the utter collapse of fingerprints has not occurred. In 1996 Starrs predicted the utter collapse of fingerprints as scientific evidence:

"The word is out and it is enough to startle, perplex and lay fingerprint examiners low. The short of it is that fingerprint identifications are worse than on the ropes. They are down and verging on being counted out. This citadel of forensic science is not only fissure-ridden. It is veering towards collapse..." (by James Starrs, from the front page of his "Scientific Sleuthing Review," Vol. 20, No. 4, Winter 1996).

To add insult to injury, his personal appearances on the witness stand, displaying inimitable verbosity, have met with ludicrous failure to convince courts his reasoning about latent print examiner testimony is sound.

Also see the [John Q. Public answer](#) for more details.

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Is fingerprint identification a science.... and can tiny fragments of finger or palm prints be reliably identified in accordance with modern legal and scientific guidelines?

Unfortunately for you, **YES**.

Unfortunately for the fingerprint experts who identified your prints, Daubert hearings are the current flavor of the month insofar as nuisance challenges your attorney can use to postpone your trial.

Humor attempts aside, if your fingerprint(s) was erroneously identified and that error is what incriminates you... there is a 100% chance that the error can be brought to light and the record set straight. For the cost of an engine tune-up, your attorney or family can hire [a certified independent expert](#) to review the incriminating identification(s).

The science of friction ridge identification is sound, and the same experts who tout its validity to identify criminals will work equally hard to rectify an identification error by one of "their own." There exists [zero tolerance](#) for identification errors.

In the very rare instance where a fingerprint identification mistake results in an erroneous criminal arrest, the agency involved is almost always very forthcoming in admitting the error (usually exposed by another agency or an independent expert).

During 1998-1999, the largest fingerprint bureau in Scotland erroneously testified to the fingerprint identification of two persons. Despite certified expert challenges, the Scottish experts refused to back-down on claims that the alleged identifications were valid. The resulting scandal exposed a combination of incompetence and/or conspiracy which was impossible to keep hidden. Numerous experts from around the world risked the potential anger of their own agencies to publicly [point out](#) the false identification.

Because the scientific discipline of friction ridge identification has no state or national boundaries, the truth WILL be known and incompetent or fraudulent identification practices will not stand. Fingerprint experts do not care whether or not you committed the crime of which you are accused, but they DO care whether or not the friction ridge identification sending you to jail (or exonerating you) is correct.

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Why do only some crime labs search unsolved case fingerprints in the FBI's national criminal fingerprint file (IAFIS)?

Q5

Who are you? Click on the correct category to see the best answer:

[Elementary School Student](#)

[John Q. Public](#)

[Police Officer](#)

[Criminal](#)

Why do only some crime labs search unsolved case fingerprints in the FBI's national criminal fingerprint file (IAFIS)?

Some crime laboratories do not have enough people or money to search fingerprints in the FBI's computerized files. Some do not even have enough people or money to operate a computerized fingerprint file for their own city or county.

[John Q. Public's Answer](#) [Police Officer's Answer](#)
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Why do only some crime labs search unsolved case fingerprints in the FBI's national criminal fingerprint file (IAFIS)?

Police administrators and laboratory managers operate within budgets. Money constraints cause tough decisions about distributing resources between patrol units, investigators and forensic scientists.

Facts about the FBI's national fingerprint database (called the Integrated Automated Fingerprint Identification System or IAFIS):

- It is the largest fingerprint database in the world and contains fingerprints of over 44 million criminals.
- It cost over \$640 million to build and is the backbone of America's criminal history repository.
- IAFIS software is free to all agencies and can be run from almost any existing desktop or laptop computer.
- The FBI provides free IAFIS software training to fingerprint experts during IAI Annual Educational Conferences.
- Only a fraction of US crime labs have obtained and used the free IAFIS interface software provided by the FBI (interfacing can be either direct or by sending electronic searches to sister laboratories connected to the FBI's IAFIS wide area network).
- Plenty of IAFIS connected crime labs are willing to provide free "searching" of unsolved murder or other serious crime latent prints for labs without IAFIS.
- The FBI can furnish a point-of-contact at an IAFIS-connected lab that is willing to search a non-connected crime lab's important case print(s). For example, the South Carolina State Crime Lab has in recent years solved murders by e-mailing prints to IAFIS-connected crime labs in adjacent states. Sometimes the South Carolina State Crime Lab e-mailed prints to an IAFIS-connected lab and received results solving a murder in less than eight hours.
- There is NO VALID REASON to delay searching unsolved murder or other serious offense latent prints in IAFIS.

Some examples of AFIS configurations and associated costs are:

Small Agency Stand-Alone Configuration - \$80,000 to \$145,000

AFIS capable of storing and searching over 20,000 finger and palm print records: starting at

[\\$30,000](#)

Annual AFIS supplies and system maintenance: \$10,000

Full-time [Certified Latent Print Examiner](#) annual salary: \$40,000 to \$105,000

Small Agency Network Configuration - \$100,000 to \$165,000

Terminal networked with a regional or state AFIS: starting at \$50,000

Annual AFIS supplies and system maintenance: \$10,000

Full-time Certified Latent Print Examiner annual salary: \$40,000 to \$105,000

Large City Crime Lab Stand-Alone Configuration - \$1,690,000 to 1,950,000

[AFIS](#) capable of storing and searching over 200,000 finger and palm print records: starting at \$1,500,000

Annual AFIS supplies and system maintenance: \$30,000

Four full-time Certified Latent Print Examiners annual salary: \$160,000 to \$420,000

FREE - FBI Software for Agencies or Crime Labs with Experts but no dollars for AFIS

The FBI's IAFIS system offers an alternative to agencies with fingerprint experts but no extra dollars for AFIS. They can use free FBI software and an existing desktop computer to prepare unsolved case latent fingerprints to be launched by sister agency crime labs with a direct connection to the FBI (such as other state crime labs if their state is not connected).

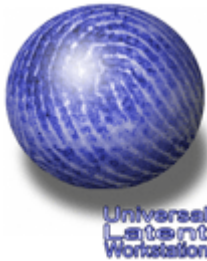
In the post-911 era, many police administrators believe that throwing millions of dollars at new computer systems will improve anti-crime/anti-terrorism abilities. A better answer is to get the entire criminal justice system to start using the existing national resources such as IAFIS. Standards need to be set for professional law enforcement management with IAFIS searching of unsolved cases as one of the "GO/NO-GO" inspection points. Agencies should do it right or turn it over to professionals who will.

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[Police Officer's Answer](#)

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The Universal Latent Workstation is the first in a new generation of interoperable latent workstations. Several state and local agencies, the FBI, NIST, and the AFIS vendors have been working together on standards to improve interoperability and sharing of latent identification services. The ULW is part of that program. It helps agencies and AFIS vendors understand and develop the concept of encode once and search anywhere. With the ULW you can create a native feature set for Printrak, Cogent, Morpho, NEC and IAFIS. Ultimately, standards-based workstations, such as the ULW, will provide you with the ability to search local, state, neighboring and the FBI IAFIS system, all with a single encoding.

[Additional information regarding ULW in PDF format, \(pdf 106k\)](#)

[Additional information regarding ULW \(HTML Version\)](#)



The Remote Fingerprint Editing Software provides the fingerprint identification community with a free and complete software package to perform remote searches into the FBI's IAFIS. RFES supports all remote IAFIS transactions to include image and features-based searches for both latent and ten-print fingerprints. RFES editing and human interface were developed based on use and advice of both local law enforcement and FBI latent specialists.

[Additional information regarding RFES in PDF format. \(pdf 134k\)](#)

From <http://www.fbi.gov/hq/cjisd/iafis.htm>

Why do only some crime labs search unsolved case fingerprints in the FBI's national criminal fingerprint file (IAFIS)?

In addition to the [John Q. Public answers here](#), you should know that there is NO GOOD REASON for the fingerprint experts supporting your agency to refrain from searching the FBI's national criminal fingerprint database.

If they will search all unsolved serious cases through IAFIS, they can expect to identify at least ten percent (and probably more) of the latent prints searched. Do not take no for an answer in requiring that they begin using IAFIS. Here are some rationalizations you might hear and answers you can give:

Rationalization: We don't have the money for an IAFIS computer terminal.

Answer: IAFIS will run on almost any existing desktop or laptop computer and the software is free. The software comes in two versions. Universal Latent Workstation (ULW) and Remote Fingerprint Editing Software (RFES) both run on almost any Windows or NT computer.

Rationalization: We don't have the money for a dedicated computer connection to IAFIS and our agency does not have a secure computer connection to e-mail criminal investigation files.

Answer: They can prepare IAFIS files and e-mail them to other agencies using a free (and secure) FBI e-mail account ([Law Enforcement OnLine](#)) or send diskettes/CDs by snail-mail.

Rationalization: We don't have the time to complete all the manual comparisons we need

to make against suspects you ask us to compare, let alone start making cases take even longer by searching them in some computer database.

Answer: Agency managers should consider disbanding the Latent Print unit if they cannot afford to staff and operate the unit in a professional manner. Ignoring IAFIS to facilitate working more cases faster is a poor management decision that does a disservice to the community.

[John Q. Public's Answer](#) [Elem. Student Answer](#)

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Why do only some crime labs search unsolved case fingerprints in the FBI's national criminal fingerprint file (IAFIS)?

Sometimes it is out of ignorance.

Sometimes the pride of an under-funded agency means that they would rather do a shabby job with fingerprint evidence and let cases go unsolved... than turn over evidence to another agency with modern methods and connectivity which could make them look bad.

If you are in one of those jurisdictions, stay put and hope the community doesn't wise-up and replace status quo police services with knowledgeable professionals.

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What is the difference between fingerprint biometrics and automated fingerprint identification systems (AFIS)?

Who are you? Click on the correct category to see the best answer:

[Elementary School Student](#)

[John Q. Public](#)

[Police Officer](#)

[Criminal](#)

q6es

What is the difference between fingerprint biometrics and automated fingerprint identification systems (AFIS)?

Biometric fingerprint systems are designed to identify persons who want to be identified.

AFIS is designed to identify persons who are trying to hide their identity.

[John Q. Public's Answer](#) [Police Officer's Answer](#)

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What is the difference between fingerprint biometrics and automated fingerprint identification systems (AFIS)?

Biometrics is a wide-ranging topic encompassing much more than just fingerprints (iris, face, voice, hand geometry, etc.), including some applications that are so novel they have never been tested in court for admissibility as a method for reliable identification. This FAQ addresses biometric fingerprint applications.

Biometric fingerprint systems are designed to identify persons who want to be identified. AFIS is nearly the opposite... it is designed to protect society by detecting criminals who do not want their fingerprints recognized.

Biometric systems are normally a business process. Such systems save companies money because it is expensive to keep reissuing lost passwords or PIN numbers. Also, biometrics offer improved security compared to the post-it notes bearing passwords often found in work cubicles or the ease of spotting someone's PIN number as they enter it into a keypad. The most secure fingerprint biometric systems use more than just a fingerprint, such as also a PIN and a card or token. Some systems use multiple biometrics such as iris and fingerprint.

Biometric fingerprint systems compare the finger or fingers of a person against records in a

computer or on a chip, to see if the person may be granted permission to do something such as access a computer or enter a room. The process does not use all the information in a fingerprint that is used by forensic scientists identifying a fingerprint. It is more like a possible, "close-enough correlation" of similarities.

In biometric systems, it is not a problem when the system fails to identify a person's fingerprint(s). The person just does not get access until they try again (often two or three times in a normal work environment) and are able to present their finger(s) in such a manner as to provide an impression with better quantity and/or quality of information (perhaps not pressed down so hard, not twisted slightly, not tipped up on one edge, etc.)

It is very common for persons using biometric systems to see a message that says "place your finger again" when the system fails to identify them regardless of how carefully they try to present their finger(s) for recording on the system.

Although some biometric systems claim to have the ability to identify persons who are registered in the system and trying to evade detection, there are fundamental logic flaws to such claims. For one thing, the distortion introduced by a person attempting to evade detection means that the computer matching score would be lower than normal. Because biometric systems operate in a "lights-out" mode (meaning that there are no human fingerprint experts sitting in a room monitoring less than optimal matching score comparisons), there would often not be a high enough matching score to trigger a red-light or alarm for a potential match due to distortion easily introduced.

Because they are "lights-out" processes, biometric systems, unlike law enforcement AFIS, can only deal with the "best" matching score between the finger(s) presented and the records on file regardless of how low the score. Law enforcement AFIS never settles for just the "best" matching score. In AFIS, lower scoring candidates in a list (not the the highest matching score) are very often the correct match for a person attempting to evade detection. The lower matching score is the natural result of slight twisting or other pressure distortion introduced by the person during the printing process. Such introduction of intentional distortion is the opposite of what biometrics are designed to deal with... biometrics are designed to ID persons who are trying to comply and trying to present good quality fingerprints so they can be granted a privilege.

The expertise required for positive identification of single-print searches is a completely different caliber from what is required for law enforcement AFIS "ten rolled fingerprint" searches. Fingerprint Examiners (called Fingerprint Clerks before the job title changed) at the FBI's huge fingerprint processing center in Clarksburg, WV are not qualified to render opinions on latent print-like single print comparisons from biometric systems. Those single-print exams are made by Latent Print Examiners such as those working in the FBI Laboratory at Quantico, VA.

The Department of Homeland Security, the FBI and US military work to fill the technology gap of "lights-out" biometrics through staffing of biometric support activities using Latent Print Examiners qualified to render opinions on single print comparisons.

What is the difference between fingerprint biometrics and automated fingerprint identification systems (AFIS)?

In addition to John Q. Public's answer [here](#), you should be aware that biometric systems normally do not capture fingerprint information in a manner consistent with law enforcement fingerprint standards (i.e., ANSI/NIST, FBI EFTS, Interpol).

Before 9-11, biometric systems almost universally touted that they were not law enforcement systems, that consumers need not fear that police might use the systems for "tracking" because only a small portion of fingerprint information (called a template) was maintained in the system to effect the comparison, and that template was definitely not compatible with law enforcement AFIS.

After 9-11, many biometric fingerprint systems instantly declared that they were the new vanguard for detecting terrorists, despite nonconformity with law enforcement AFIS to enable import and comparison of suspects' fingerprints... despite the absence of fingerprint hardware that captured rolled fingerprints at the correct pixel per inch resolution... and

despite the absence of fingerprint recording devices (platens) that could capture four simultaneous fingerprints for sequence verification required by all law enforcement AFIS systems.

After 9-11, agencies like the Immigration and Naturalization Service (now part of the Department of Homeland Security or DHS) immediately began beefing-up biometric systems used at borders to fill the gaps between that technology and law enforcement AFIS. DHS employs well-qualified forensic fingerprint experts (Latent Print Examiners) who effect identifications impossible using only "lights-out" biometric technology.

However, some other agencies without law enforcement fingerprint experience or expertise (those agencies who failed to research standards always prominently posted at www.fbi.gov, [ANSI/NIST](#) and [Interpol](#)) may have been fooled by biometric vendors into thinking that they were adopting electronic fingerprint systems that were as accurate and robust at detecting terrorists via fingerprints as law enforcement AFIS. Some activities have captured tens of thousands of persons' fingerprints in nonstandard formats presenting tremendous problems for vetting against law enforcement AFIS collections of known and suspected terrorists and other criminals.

A large federal laboratory like the FBI or Army Crime Laboratory may only search somewhere in the neighborhood of 5,000 to 10,000 (these are estimates) single fingerprints per year against the FBI's national AFIS (IAFIS). Thus, searching a collection of tens of thousands of nonstandard fingerprint records as latent print searches is a monumental task.

Because nonstandard biometric systems cannot accept law enforcement standard rolled fingerprint records, the internal comparisons in such systems are often not very meaningful insofar as detecting persons on law enforcement/terrorism watch lists. The most wanted terrorist in the world could register in the system easily just by giving a false name. He is then known in that system under the false identity. He is free to plan attacks on the facility using information learned while he was permitted inside. Isolated biometric systems incapable of interfacing with law enforcement AFIS give a false sense of security insofar as vetting against the thousands of known and suspected terrorists' fingerprints the US government has on file in law enforcement AFIS networks.

Also, non-law enforcement standard electronic fingerprints complicate (and in most biometric systems preclude) comparison against latent prints harvested from bombs and other terrorism-related evidence. **Department of Homeland Security, the FBI and US military biometric support activities have created specialized systems that increase the ability to utilize nonstandard fingerprints for conventional law enforcement type comparisons... and some great successes have occurred to identify latent fingerprints and record fingerprints of criminals, including known and suspected terrorists' fingerprints on bombs and other important evidence.**

q6c

What is the difference between fingerprint biometrics and automated fingerprint identification systems (AFIS)?

Biometrics is the system you will use in prison so you can get back in from the exercise yard or go to the cafeteria.

AFIS is the system that puts you there.

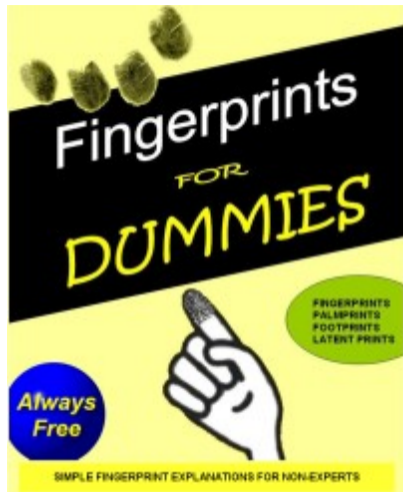
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SIMPLE FINGERPRINT EXPLANATIONS FOR NON-EXPERTS



Fingerprints FOR DUMMIES

Frequently Asked Questions
about Fingerprints,
Palmprints, Footprints, and Latent Prints